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Tommy Hansen

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EXAMINER

HYUN, PAUL SANG HWA

ART UNIT

PAPER NUMBER

1797

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DELIVERY MODE

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/700,522

Applicant(s)

HANSEN ET AL.

Examiner

Paul S. Hyun

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5 and 7-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5 and 7-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### REMARKS

Claims 1, 3-5 and 7-10 are currently pending. Claims 1 and 7 were amended.

The claim objection cited in the previous Office action has been withdrawn in light of the amendment.

The Exhibit filed by applicants has been acknowledged.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims **1 and 7** are rejected 35 U.S.C. 103(a) as being unpatentable over Öttele (US 4,160,010) in view of Dunster et al. (US 4,865,820) and Ravault (US 3,895,917).

Öttele discloses a reactor for conducting chemical reactions (see Figs. 1 and 2). The reactor comprises a reactor shell 12 comprising an inlet and an outlet, a catalyst bed 22, and an impermeable basket in the form of metallic foil 30 that surrounds the sidewalls of the catalyst bed and flanges 34 that extend in a direction transverse to the inlet to support the catalyst bed. The foil 30 prevents the sample gas from circumventing the catalyst bed (see claim 1). The reactor disclosed by Öttele differs from the claimed invention in that Öttele does not explicitly disclose that the catalyst bed is designed for

partial oxidation of hydrocarbons. Öttele also does not explicitly disclose the method step of partially oxidizing hydrocarbons. Lastly, Öttele does not disclose a ceramic coating.

With respect to the partial oxidation of hydrocarbons, Dunster et al. disclose that reactors for partially oxidizing hydrocarbons are well known in the art (see lines 13-25, col. 1). Such reactors oxidize hydrocarbons to carbon monoxide, carbon dioxide and hydrogen. The products of the partial oxidation can be used as fuel or reactants for the synthesis of more complex compounds. Dunster et al. also disclose the use of a platinum-palladium catalyst for partially oxidizing hydrocarbons (see lines 15-25, col. 4). In light of the disclosure of Dunster et al., it would have been obvious to one of ordinary skill in the art to substitute the catalyst bed disclosed by Öttele with the catalyst bed disclosed by Dunster et al. so that the reactor can be used to partially oxidize hydrocarbons. It also would have been obvious to conduct a partial oxidation of hydrocarbons using the modified reactor since the reactor is designed to conduct such reactions.

With respect to the ceramic coating, Ravault discloses a reactor comprising a catalyst bed wherein the outer walls of the bed are coated with ceramic and then glazed to render the walls impermeable (see claim 2). In light of the disclosure of Ravault, it would have been obvious to one of ordinary skill in the art to coat the inner walls of the foil of the modified Öttele reactor to reinforce the impermeability of the metallic foil.

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Claims **3-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Öttele in view of Dunster et al. and Ravault as applied to claims 1 and 7, and further in view of Mentschel (US 4,018,573).

None of Öttele, Dunster et al. and Ravault disclose a heating means to maintain a high reaction temperature inside the reactor.

Mentschel discloses a reactor comprising an electric heater for controlling the temperature of the reaction within the reactor (see lines 20-35, col. 7). In light of the disclosure of Mentschel, it would have been obvious to one of ordinary skill in the art to provide a heater around the foil and ceramic coating of the modified Öttele reactor so that a desired reaction temperature can be maintained within the modified reactor.

Claims **8 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Öttele in view of Dunster et al. and Ravault as applied to claims 1 and 7, and further in view of Hahn et al. (US 3,642,447).

None of Öttele, Dunster et al. and Ravault disclose the optimal temperature for partially oxidizing hydrocarbons.

Hahn et al. disclose that hydrocarbons oxidize at 1,000 degrees Celsius (see lines 50-55, col. 1). In light of the disclosure of Hahn et al., it would have been obvious to one of ordinary skill in the art to conduct the partial oxidation at 1000 degrees Celsius since hydrocarbons oxidize at this temperature.

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Claim **10** is rejected under 35 U.S.C. 103(a) as being unpatentable over Öttele in view of Dunster et al. and Ravault as applied to claims 1 and 7, and further in view of Werges (US 3,929,421).

None of Öttele, Dunster et al. and Ravault disclose a grid to support the catalyst bed. However, Öttele does disclose the use of flanges to support the catalyst bed.

Werges discloses a reactor comprising a bed of catalyst supported by a grid 63 (see Fig. 7). In light of the disclosure of Werges, it would have been obvious to one of ordinary skill in the art to substitute the flanges of the modified Öttele reactor with a grid to provide the modified reactor with a means that supports the entire catalyst bed.

### ***Response to Arguments***

Applicants' arguments with respect to the art rejections have been considered, but they are moot in view of the new grounds of rejection. Nonetheless, Applicants' arguments will be addressed because no new references are cited. That said, Applicants' arguments have been fully considered but they are not persuasive.

1) Applicants argue that the modification of Öttele is not feasible because the reactor disclosed by Öttele is ill designed to carry out partial oxidation of hydrocarbons, which requires the reaction to be conducted at elevated pressures. Applicants cite Exhibit A to provide evidence that partial oxidation of hydrocarbons must be conducted at elevated pressures (i.e. 4 MPa). This argument is not persuasive for several reasons:

A) Applicants appear to have misinterpreted the disclosure of Exhibit A. Exhibit A discloses that steam reforming process in tubular furnaces can be conducted at a

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pressure up to 4Mpa, not catalytic partial oxidation. Exhibit A discloses that the process for catalytic partial oxidation differs from steam reforming process in tubular furnaces.

B) Exhibit A does disclose that higher pressure can be applied in catalytic partial oxidation than in tubular steam reforming. Regardless, this merely suggests that partial oxidation CAN be done at elevated pressures, not that it MUST be conducted at elevated pressures. In fact, Yoshida et al. (US 4,115,074) disclose a method for partially oxidizing hydrocarbons using a reactor comprising a catalyst bed wherein the partial oxidation is carried out at atmospheric pressure (see claim 4).

2) Applicants argue that the reactor disclosed by Öttele is configured to operate horizontally whereas the claimed invention is configured to operate vertically. Therefore, Applicants argue that bottom support of the catalyst bed is not required in the reactor disclosed by Öttele. This argument is not persuasive because regardless of the orientation of the reactor during use, Öttele does address the need to provide support for the catalyst bed. Öttele discloses that rings 34 and 36 aid in the axial retention of the catalyst bed (see lines 1-10, col. 3).

3) Applicants argue that the difference between the reactors disclosed by Öttele and the claimed invention with respect to tightness is also significant. This argument is not persuasive because the reactor disclosed by Öttele is also concerned with the consequence of gas leaking or bypassing the catalyst bed. Öttele discloses a metallic foil surrounding the catalyst bed that prevents gas from leaking or bypassing the catalyst bed. Therefore, the difference in the tightness requirement alleged by Applicants is unclear.

4) Applicants also argue that there is no motivation to combine the Öttele reference with the Dunster et al. reference. Specifically, Applicants argue that a person of ordinary skill in the art would not have been motivated to change the reactor of Öttele with the reactor disclosed by Dunster et al. This argument is not persuasive because the rejection did not suggest such modification. The Dunster et al. reference was relied upon for disclosure directed towards the ability of a reactor to partially oxidize hydrocarbons. In fact, the disclosure relied upon in the rejection does not even concern the reactor disclosed by Dunster et al. Rather, the disclosure relied upon merely discloses that it is well known in the art to partially oxidize hydrocarbons using a reactor comprising a catalyst bed. Based on this disclosure, one of ordinary skill in the art would be motivated to partially oxidize hydrocarbons using the reactor disclosed by Öttele.

5) Applicants argue that there is no motivation to apply the teachings of Ravault. Applicants argue that since Öttele already discloses a metallic foil that is impermeable, there is no motivation to provide another layer of impermeable layer. The Examiner maintains the position that reinforcement is sufficient motivation for providing an additional layer.

6) Applicants argue that Mentschel does not disclose a motivation for providing a heater inside a reactor. Applicants argue that while Mentschel does disclose a heater associated with a reactor, the heater is situated outside of the reactor. This argument is not persuasive because it appears that Applicants mischaracterized the disclosure of Mentschel. It should be noted that the heater disclosed by Mentschel is positioned within a reactor wherein the reactor encompasses the entire structure shown in Figure



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2. It appears that Applicants interpreted the reactor to be delimited by wall 101 when in fact wall 101 only delimits the reaction chamber.

7) Applicants argue that reliance on Hahn et al. is inappropriate because Hahn et al. disclose the temperature at which full oxidation of hydrocarbons occur, not partial oxidation as recited in the claims. This argument is not persuasive because it appears that the difference between catalytic full oxidation and catalytic partial oxidation is determined by the ratio of the reactants and the catalyst used in the reaction, not the temperature at which the reaction occurs. Therefore, it appears that the temperature range disclosed by Hahn et al. is a conventional temperature range for conducting partial oxidation of hydrocarbons.

8) Lastly, Applicants argue that reliance on the disclosure of Werges is inappropriate because the direction of gas flow in the reactor disclosed by Werges is opposite the direction of the gas flow in the reactor disclosed by Öttele. This argument is not persuasive because Werges was relied upon for its disclosure of a grid that supports the catalyst bed. The direction of gas flow does not appear to be relevant in applying the specific teaching of Werges relied upon in the rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yoshida et al. (US 4,115,074). Yoshida et al. disclose that partial oxidation of hydrocarbons can be conducted at atmospheric pressure.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul S. Hyun whose telephone number is (571)-272-8559. The examiner can normally be reached on Monday-Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PSH  
10/26/07

  
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